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troduce measures at will. No important bill can be considered until several rival measures have been pigeonholed. Even then the bill is subject to the tender mercies of committee action, proposed and actual amendment when before the whole body, change in the other house of the legislature, the compromises of a conference committee and possible executive veto. The executive's program of legislation should be given the right of way. The bills should be drafted by an expert draftsman working under the direction of a committee of competent authorities on the subject-matter of the measure. Amendments should be permitted only with the consent of the drafting committee. When it is recognized that legislation is a science we shall be well toward an efficient democracy.

Finally, constitutional changes should be constructed in quite different fashion from present methods. Reverence for custom and imitation may have their uses, but they are hardly reliable guides for the reconstruction of government. Piecemeal change has slight justification, if a single gain is used as an excuse to preserve several outworn practises. Periodically the whole social and economic structure of the governmental area should be examined, the standards and desires of all groups ascertained and then a governmental organization be framed in the light of this information for the realization of democratic aims without regard to the fate of the old framework. We should cease trying to make society conform to what a few consider correct government, and instead mold our government to conform to the facts of society.

If, throughout our operation of political institutions we advance patiently to the acceptance of the experimental attitude and the method of social diagnosis as our basis of action, democracy may presently be safe for scientific standards.

RAILROAD FINANCE FROM THE STANDPOINT OF EFFICIENCY

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IN studying the problems of railroad finance and credit, there are two angles of approach: rates and costs. The first is in the hands of the Interstate Commerce Commission; the second is in the hands of the railroads.

The solution of the financial problem through increased rates seems hopeless, because there is little probability that the Interstate Commerce Commission will grant a substantial rate increase. Even if the roads were granted all they ask, it would not be long before they felt the effect of the "vicious circle" of costs rising at a faster rate. Their relative position would register no improvement. It is a case of lifting yourself by your bootstraps.

The solution of the problem by cutting down costs is the only course open to the roads. It is a question of efficiency and scientific management of present railroad equipment. Economy of operation is forced on the railroads because of abnormal traffic volume at a time when they are short of labor and equipment. In the first six months of 1917, American railroads handled 14 per cent. more freight than during a corresponding period of 1916, and 50 per cent. more freight than for the same months of 1915. In the same period the railroads added to their equipment 1 per cent. new mileage; 2 per cent. new locomotives; 3 per cent. new freight cars. This disparity between traffic demands and new equipment has compelled the railroad managers to study intensively the best improved methods of operation.

To meet the new traffic conditions, railroad policy has been directed in order to secure two general results: first, unified and central executive control; second, maximum efficiency in the use of labor and equipment.

The desire for a policy of centralized control is not new as far as the railroads are concerned. The approval of the government, however, is a decidedly new attitude. The railroads have been attempting a scheme of pooling or consolidation since the period of cut-throat competition and insolvency in the '70s. First the pooling of earnings was tried, but declared illegal by the Interstate Commerce Law of 1887. Then the roads resorted to the pooling of traffic. This practise was outlawed by the application of the Sherman Anti-trust law of 1890, applied to the railroads in the Trans-Missouri decision in 1897. The railroads then tried the pooling of securities, but here again they were checkmated by the ruling of the United States Supreme Court in the Northern Securities case. The last attempt at consolidation has been the recent attempt to pool equipment in Trunk Line territory. If it had succeeded, government operation of the roads during the period of the war would not have been necessary. The failure of this pooling arrangement seems to have been due to confusion arising from the conflict of orders given both by the government priority committee and the committee representing the railroads. The policy adopted by Mr. Wilson of operating the railroads of the country as a unit should produce maximum efficiency of operation, and also safeguard the financial interests of the investors.

The solution of the present railroad problems, however, can not be reached by merely centralized control, much as such a scheme may help. Greater efficiency in the use of present railroad equipment must be quickly developed.

A few years ago, Mr. Louis Brandeis made the statement that by the use of up-to-date methods of handling labor, and the application of practical science in working their plant, the railroads of the United States could save $1,000,000 a day. Whether the remark was true or not, the railroads within the last few months have learned the value of scientific management in such matters as packing, handling freight at terminals, loading cars, and especially in generating locomotive power.

With regard to packing, the railroads, in cooperation with the shippers of the country, can effect great saving of space, which will, of course, reduce unit costs of operation. As an example of the need of improvements in packing, the cotton situation might be cited. A recent article which appeared in the *Textile Recorder* of Manchester, England, points out that the present density of the United States bale is 22 pounds; the Egyptian 37; the Indian and Chinese from 45 to 60. The article concludes that, were the American compress methods more improved, a saving of vessel cargo space would total 9,305,000 tons dead weight. The argument which applies to vessel space could be drawn with equal force to freight-car space which could be utilized to relieve the present traffic congestion.

In the matter of loading cars, the roads have effected substantial economies. Comparing the first six months of 1916 and 1917 the railroads of the country increased the average carload from 24.4 tons to 27 tons. This savings is equivalent to adding to the rolling-stock equipment 200,000 freight cars.

The improvements in handling "less than carload" shipments have been especially noticeable. Fairfax Harrison, chairman of the Railroads War Board, recently issued the following significant statement:

> On 77 of the principal railroads of the United States, a saving of 114,109 cars was effected in one month this year solely by increasing the "less than carload" freight. The reports show that the average loading for that class of freight during July this year was 13,927 pounds, as compared with an average of 11,619 pounds during the same month last year.

At seaboard terminals, where congestion is greatest, efficiency in freight handling is being developed. At the Pennsylvania R. R. piers, New York, located on the North River, mechanical improvements in recent years have reduced the cost of handling bulk freight, such as coke, coal and limestone, from $.56 to $.04 per ton. A 12,000-ton steamer can be loaded in twenty-three minutes. However, in the handling of mixed cargoes, methods had improved very little within the last fifty years. Recently the use of the electric tractor, to which is attached a train of four or five trailers, has produced results very satisfactory in comparison with the use of hand trucks. The speed of the hand truck is approximately one mile per hour; that of the tractor-train is about 4 miles per hour. The following comparison indicates the relative saving of work:

Packages	Weight	Trailers	Equivalent in Hand Trucks
40 boxes, oranges	31,200	3	10
102 half chests of tea	7,650	5	25
12 cases, tobacco	2,520	3	12
146 packages, groceries	3,400	4	29

Possibly the place where railroad efficiency can be promoted to the greatest extent is in their locomotives. It is estimated that of the 63,500 locomotives in use on American railroads, only one third are mechanically modern. To make the two thirds modern would require an average expenditure of $3,000 per locomotive, involving a total expense of $120,000,000. The result would be an increase in general equipment capacity of about 33 per cent. To increase capacity to this extent in any other way would probably cost about thirty times this amount, or $3,600,000,000. Even if the steel and labor, necessary for such enlargement, were available, the present condition of the money market would make such financing impossible. President Markham, of the Illinois Central R. R., has pointed out that as a result of mechanically improving the locomotives on his line, an average freight mileage of 40 miles per day has been reached. Just what this achievement means will be appreciated when it is remembered that the average freight mileage for the United States is 29 miles per day.

The possibilities of the electric locomotive are being seriously investigated by railroad men. Mr. F. H. Shepard, of the Westinghouse Electric and Manufacturing Company, says that the "electric locomotive of to-day, in its ability to handle the heaviest trains in congested service, to make long sustained runs and to remain continuously in service, has demonstrated its unquestionable superiority over any method of steam operation."

The electric locomotive has probably had its best test on the Chicago, Milwaukee and St. Paul, where it has been tried out on 226 miles of difficult grade on the Rocky Mountain Division. Vice-President Goodnow sums up the following advantages of electric compared to steam locomotives:

1. Higher efficiency in cold weather.
2. Has made double tracking unnecessary.
3. 11.3 per cent. of the power consumed has been generated by trains on down grade.
4. Greater ease and safety in handling trains on grades, involving less wear and tear on equipment.
5. "Dynamic breaking," or the holding of trains at uniform speed on down grades without the use of air brakes.
6. Longer and heavier trains.
7. Greater speed.
8. Possible elimination of round-houses.
9. More work from one half the number of locomotives.

The possibilities of generating electric energy by the use of water power is another item in favor of the use of the electric locomotive. One fourth of our coal supply is consumed by the railroads. The substitution of any other source of power would not only solve a vital problem for American railroads, but also have far-reaching industrial effects in the period of reconstruction which must follow this war.

In conclusion, the following interesting statement regarding the problem of railroad efficiency was made a short time ago by Mr. Henry Ford:

> The freight car weighs as much as the load it carries. Heavy cars require heavy engines, heavier rails, greater strains in starting and stopping, more coal, heavier bridges, and the result is increased waste and depreciation. Four fifths of a railroad's work to-day is hauling the deadweight of its own wastefully heavy engines and cars.
>
> Nature has distributed alloy materials which, with heat treatment, make steel of 150,000 or 200,000 pounds tensile strength, instead of 50,000, and then the weight can be cut down proportionately. Alloy steel of high tensile strength cuts down the weight.

Whether the railroads remain in the hands of the government, or are returned to their present owners, the problem of efficiency along the general lines suggested above, must be studied by operation and traffic managers. An unprecedented traffic crisis, which will continue indefinitely after the conclusion of peace, calls for rigid economy and intelligent cooperation.